

**L8(4.5) Factoring Special Quadratics (Perfect Square Trinomials & Differences of 2 Squares)**

## 1. Perfect Square Trinomial

(a)  $a^2 + 2ab + b^2 = (a + b)(a + b)$

$= (a + b)^2$

(b)  $a^2 - 2ab + b^2 = (a - b)(a - b)$

$= (a - b)^2$

Note:

- I. Standard methods, such as **alge-tiles** or **decomposition (SPI or MAN)** will also work, but may take longer.
- II. It is critical to check the **2ab** term to make sure you have a perfect square, or verify your final answer by expanding.

Remember

1

4

9

16

25  
36  
49  
64  
81  
100  
121  
144  
169  
196  
225  
256  
289  
324  
361  
400  
441  
484  
529  
576  
625  
676  
729  
784  
841  
900  
961  
1024  
1089  
1156  
1225  
1296  
1369  
1444  
1521  
1600  
1681  
1764  
1849  
1936  
2025  
2116  
2209  
2304  
2401  
2500  
2601  
2704  
2809  
2916  
3025  
3136  
3249  
3364  
3481  
3600  
3721  
3844  
3969  
4096  
4225  
4356  
4489  
4624  
4761  
4900  
5041  
5184  
5329  
5476  
5625  
5776  
5929  
6084  
6241  
6400  
6561  
6724  
6889  
7056  
7225  
7396  
7569  
7744  
7921  
8100  
8281  
8464  
8649  
8836  
9025  
9216  
9409  
9604  
9801  
10000

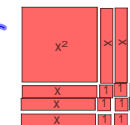
Ex.1 Factor using a pattern (if possible)

(a)  $x^2 + 6x + 9$

$$= (x+3)(x+3)$$

$$= (x+3)^2$$

M: 9  
A: 6  
N: 3, 3



(b)  $4x^2 - 12x + 9$

$$= (2x-3)(2x-3)$$

$$= (2x-3)^2$$

M: 36  
A: -12  
N: -6, -6

(c)  $25x^2 - 30x + 9$

$$= (5x-3)(5x-3)$$

$$= (5x-3)^2$$

M: 225  
A: -30  
N: -15, -15

Ex.1 Factor using a pattern (if possible)

(a)  $x^2 + 12x + 36$

$$= (x+6)(x+6)$$

$$= (x+6)^2$$

(b)  $x^2 + 13x + 36$

$$= x^2 + 4x + 9x + 36$$

$$= x(x+4) + 9(x+4)$$

$$= (x+9)(x+4)$$

M: 36  
A: 13  
N:

$$\begin{array}{r} 36 \\ 1 \times 36 \\ \hline 2 \times 18 \\ \hline 3 \times 12 \\ \hline 4 \times 9 \end{array}$$

(c)  $4x^2 - 20x + 25$

$$= (2x-5)(2x-5)$$

$$= (2x-5)^2$$

2. Difference of Squares

$$a^2 - b^2 = (a + b)(a - b)$$

$$= (a - b)(a + b)$$

(the order of the binomials does not matter)

Examples:

(a)  $4x^2 - 9$

$$= (2x-3)(2x+3)$$

$$= 4x^2 + 6x - 6x - 9$$

$$= 4x^2 - 9$$

(b)  $9x^2 - 16$

$$= (3x-4)(3x+4)$$

Ex.2 Factor

(a)  $k^2 - 121$

$$= (k-11)(k+11)$$

(b)  $81m^2 - 144$

$$\begin{aligned}
 &= (9m+12)(9m-12) \\
 &= 3(3m+4) \times 3(3m-4) \\
 &= 9(3m+4)(3m-4)
 \end{aligned}$$

Ex.3 Factor using a special pattern:

(a)  $25d^2 - 144$

$$= (5d-12)(5d+12)$$

(b)  $16x^2 + 24xy + 9y^2$

$$\begin{aligned}
 &= (4x+3y)(4x+3y) \\
 &= (4x+3y)^2
 \end{aligned}$$

(c)  $18p^2q - 60pq + 50q$

$$\begin{aligned}
 &= 2q(9p^2 - 30p + 25) \\
 &= 2q(3p-5)(3p-5) \\
 &= 2q(3p-5)^2
 \end{aligned}$$

(d)  $98a^2 - 32b^2$

$$\begin{aligned}
 &= 2(49a^2 - 16b^2) \\
 &= 2(7a+4b)(7a-4b)
 \end{aligned}$$

4a<sup>2</sup> & 16  
 Must have negative  
 difference  
 of squares

Ex.4: Factor  $x^2 - 10x + 25 - w^2$ 

$$= (x-5)(x-5) - w^2$$

$$= (x-5)^2 - w^2 \quad \text{let } a = (x-5)$$

$$= a^2 - w^2$$

$$= (a-w)(a+w)$$

$$= (x-5-w)(x-5+w)$$

Assigned Work:

p. 230-231 # 3bc, 5, 6, 7, 10, 11, 14